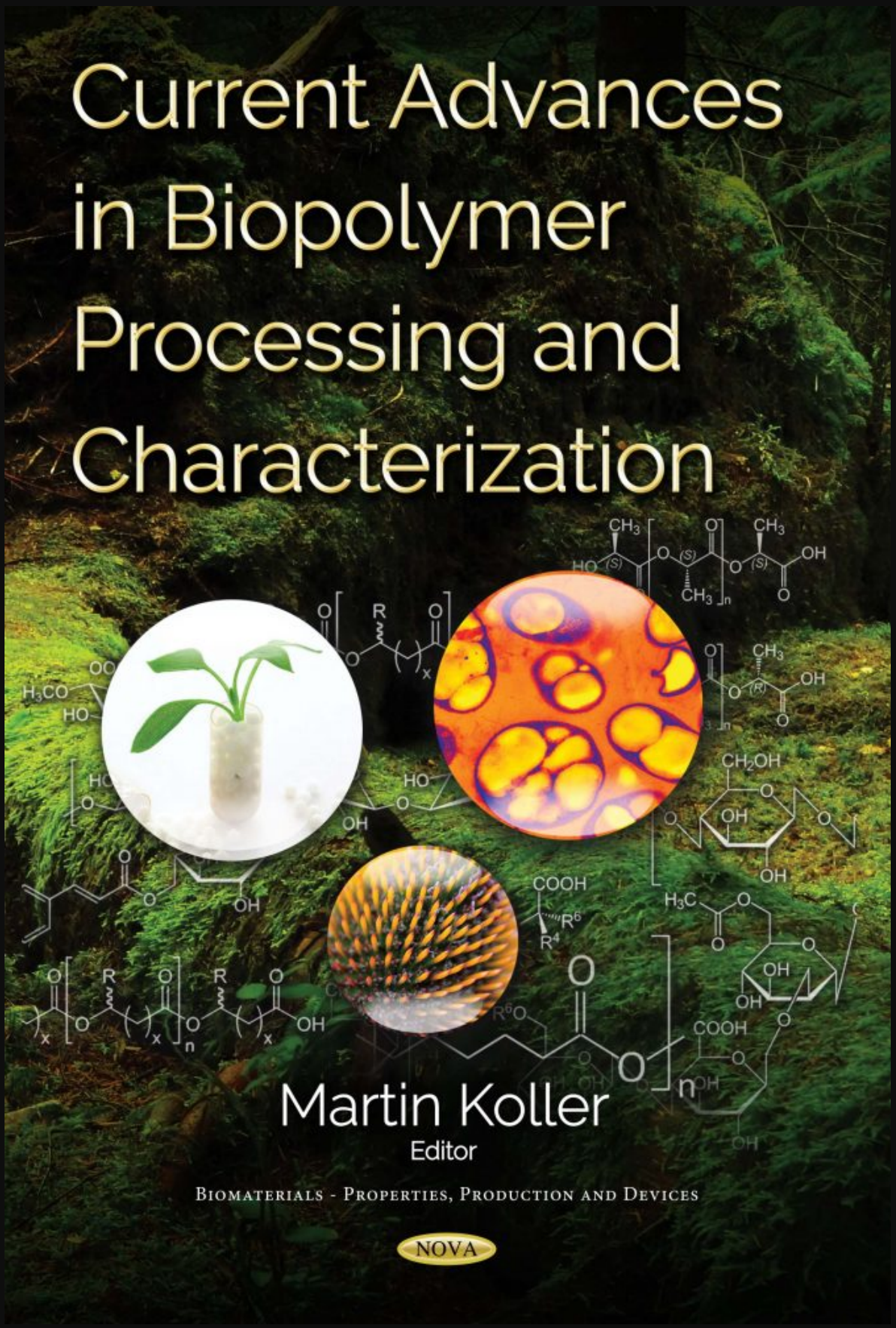
Current Advances in Biopolymer Processing and Characterization



Martin Koller
Editor

Biomaterials - Properties, Production and Devices

NOVA

add_to_wishlist=16579)

ISBN: 978-1-53612-710-2
Categories: Biomaterials - Properties, Production and Devices (https://novapublishers.com/product-category/series/biomaterials-properties-production-and-devices/), Biotechnology (https://novapublishers.com/product-category/books/science-and-technology/life-sciences/biology/biotechnology/), Biology (https://novapublishers.com/product-category/books/science-and-technology/life-sciences/biology/), Life Sciences (https://novapublishers.com/product-category/books/science-and-technology/life-sciences/)
Tags: 9781536127102 (https://novapublishers.com/product-tag/9781536127102/), 9781536127119 (https://novapublishers.com/product-tag/9781536127119/), biotechnology (https://novapublishers.com/product-tag/biotechnology/)

Details | Table of Contents | Additional Information

The book presents current R&D activities to unravel the physico-chemical properties of diverse “biopolymers”, and their processing towards functionalized, high-performance bio-products with defined applications. The importance of this research becomes obvious by considering the annual plastic production of about 330 Mt, the lion´s share thereof based on the conversion of fossil feedstocks that is highly recalcitrant against biodegradation. Alternative environmentally degradable plastics cover not even 5% of today´s plastic market. Such “biopolymers” encompass various macromolecules of biological origin with diverse monomeric composition, and manifold physico-chemical properties. This structural diversity makes them potential candidates to produce bulk materials, e.g., for packaging purposes, smart functionalized materials in special niches like the biomedical field. Consequently, we witness an increasing trend towards new natural polymers to replace well-established products like plastics. After decades of global R&D developments in this field, and numerous body blows on the way to the anticipated market breakthrough of biopolymers, it is generally recognized that the success of such new materials needs progress in both material performance and production prices.

The book Current Advances in Biopolymer Processing & Characterization is dedicated to the current state-of-the-art of production, modification, characterization, and processing of two major biopolymer groups:
Firstly, polysaccharides, nature´s most abundant raw materials, are represented by specialized contributions on biomedical applications of starch and its follow-up products. Polysaccharides were also studied for the examples of functionalized thermoplastic starch, molecular and hydrocolloidal characteristics of xanthan in aqueous environments, and by the design of functionalized xylan-based bio-materials.
Secondly, the second series of contributions encompasses diverse biopolyesters. Advanced methods to improve the properties of PLA, fine-tune PLA properties by triggering PLA´s crystallization rate during melt processing, and the strongly emerging field of 3D-printing of PLA, PCL, and microbial PHA are described.

Finally, the authors familiarize the reader with the application of mixed microbial cultures to produce PHA heteropolyesters with different thermo-mechanical properties in dependence on cultivation strategy and the microbial species' composition.

This compilation of new biomaterials with surprising functions and performance, based on these natural polymers will address scientists active in biopolymers production, functionalization, characterization, and processing towards "bio-technomers". The book is also dedicated to undergraduate students of polymer chemistry and polymer processing, and to representatives of the polymer industry who are interested in developing innovative, sustainable and smart polymeric products. Activities motivated by reading this book shall boost the impatiently desired market penetration of biopolymers and their follow-up products. Such materials definitely display a socioeconomic impact by addressing prevailing ecological concerns such as depleting fossil resources, growing piles of plastic waste, and increasing global warming. The contributions to this book illustrate that "bio-inspired" remedies for prevalent ecological problems are already available, developed by experts in polymer sciences and engineering, or that these solutions are at least in the status of development. (Imprint: Nova)

NOVA SCIENCE PUBLISHERS, INC.

Nova publishes a wide array of books and journals from authors around the globe, focusing on Medicine and Health, Science and Technology and the Social Sciences and Humanities.

We publish over 1,500 new titles per year by leading researchers each year, and have a network of expert authors, editors and advisors spanning the global academic community in pursuit of advanced research developments.

We invite you to browse our site to find the books or journals of particular interest to you.

Headquarters:
Nova Science Publishers, Inc.
415 Oser Avenue, Suite N
Hauppauge, NY, 11788 USA

Tel: 1-631-231-7269
Fax: 1-631-231-8175

Preface

List of Contributors

Chapter 1. Polysaccharides: Structures and Materials for Biomedical Applications (pp. 1-14)
Rupert Kargl, Tamilselvan Mohan and Karin Stana Kleinschek

Chapter 2. Green Chemistry Functionalization of Thermoplastic Starch and Its Relevance for Industrial Applications (pp. 15-48)
Barbara Fahrngruber, Markus Schuster, Rupert Wimmer and Norbert Mundigler

Chapter 3. Xylans: Biopolymers for the Design of Highly Engineered Polysaccharide Derivatives with Promising Properties (pp. 49-76)
Lars Gabriel and Thomas Heinze

Chapter 4. Xanthan in Aqueous Media: Molecular and Hydrocolloidal Characteristics (pp. 77-92)
Peter Wintersteller, Arbresha Muriqi, Diellza Bajrami, Gjylije Hoti, and Anton Huber

Chapter 5. Polysaccharide-Based Polyelectrolyte Complexes for Biomedical Applications (pp. 93-120)
Andrea Morelli, Dario Puppi and Federica Chiellini

Chapter 6. 3D Processing of (Bio)Degradable Materials (pp. 121-168)
J. W³odarczyk, W. Sikorska, J. Rydz, B. Johnston, G. Jiang, I. Radecka and M. Kowalczuk

Chapter 7. Advances in Methods for Improving Polylactide Properties (pp. 169-204)
Miroslav Huskiæ and Andrej Kržan

Chapter 8. Crystallization Kinetics of Poly(Lactic Acid) during Melt Processing (pp. 205-222)
Hendrik Schäfer and Adriana Kovalcik

Chapter 9. PHA Copolymers from Microbial Mixed Cultures: Synthesis, Extraction and Related Properties (pp. 223-276)
Mauro Majone, Laura Chronopoulou, Laura Lorini, Andrea Martinelli, Cleofe Palocci, Simona Rossetti, Francesco Valentino and Marianna Villano

Index (pp. 277)